



Recycling Intermediate and High Voltage (IV/HV) Batteries from GM Hybrid Vehicles

Information Package for Vehicle Dismantlers**

Version 1.1 September 24, 2008

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****For Dealership Service Departments:** This document is only intended for vehicle dismantlers who recycle automobiles at the end of their useful life. During normal vehicle service operations, please refer to current service information manuals and bulletins for information on the return of intermediate and high voltage (IV/HV) batteries.

NOTE: This document does not cover the recycling process for lead-acid starter batteries . These batteries have established collection and recycling processes.
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Introduction:

GM hybrid vehicles contain a new intermediate voltage (IV) or high voltage (HV) battery pack. These batteries store the energy generated by the vehicle (e.g. when braking the vehicle to a stop) for future use (electric mode).

There are several battery types that are currently being used or investigated for use in hybrid vehicles. The most common are the nickel metal hydride (NiMH). However, there is research into new types of batteries which are Lithium Ion (Li-ion) based.

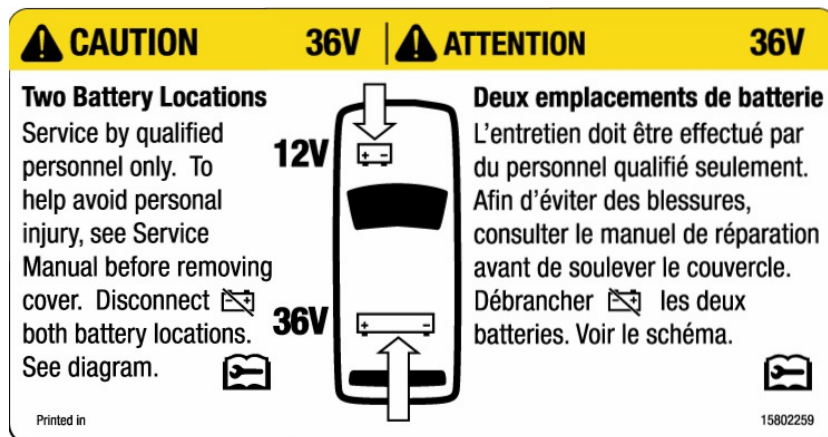
It is important to understand that these new “IV/HV” batteries can be recycled. Recycling of batteries conserves natural resources since metals within the batteries can be recycled. In the case of the NiMH battery, the primary metal for recovery is nickel. For Lithium-Ion based batteries, the cobalt and/or lithium may be recovered.

You are responsible for complying with all federal, state, and local laws and regulations relating to the management of IV/HV batteries generated at your facility. Please note that state and/or local laws can be more stringent than federal regulations, so be sure to check all three. For a list of state environmental agencies, go to <http://www.epa.gov/epahome/state.htm>. For local contacts, check your local government listings in your phone book.

Identifying a GM Hybrid Vehicle:

Hybrid vehicles can usually be identified by noting the following attributes:

- Hybrid logo on the rear of the vehicle
 - Hybrid identification/logo under the hood (various locations)
 - Orange cables (high voltage wiring) or blue cables (intermediate voltage wiring)
- GM hybrid vehicles will have a caution label under the hood that will be similar to the following label:



Removal of the IV/HV Battery Pack

Prior to conducting any work on the vehicle, it is important to disconnect both batteries (the 12 volt lead acid starter battery and the IV/HV battery).

1. IV/HV batteries are typically located under or behind the rear seat in the vehicle.
2. 12V lead acid batteries continue to be located in the engine compartment.

Consult the service manual for the vehicle, or qualified service personnel at your local dealership, to avoid personal injury when disconnecting and removing IV/HV batteries.

GM service manuals are available at: <http://www.helminc.com/helm/homepage.asp?r>.

GM Emergency Responder Information is available at:

<http://www.gmstc.com/FirstResponder.aspx> You can also check the yellow pages to locate the nearest GM (Chevrolet, Pontiac, Saturn, Saab, Buick, Cadillac, GMC, Hummer) dealership.

Battery packs vary in size and weight due the specific vehicle electrical requirements. The typical range in weight is about 50-150 pounds (25-70Kg). The typical volume range is about 70-80 liters. In most cases, the larger battery packs will be found in trucks and smaller packs in cars. It is recommended that you have appropriate support (manpower or equipment) available when physically removing the battery from the vehicle.

IV/HV Battery Storage and Shipment

Storage and shipping guidelines for IV/HV batteries are available from the manufacturer of the battery on their Material Safety Data Sheet (MSDS) or equivalent document (e.g. Product Safety Data Sheet (PSDS)). These documents should be obtained from the website of the battery manufacturer.

www.cobasys.com

-<http://www.peve.jp/e/index.html>

Information can also be provided by the recyclers who accept these types of batteries for recycling (see “Commercial Battery Collectors and Recyclers” section). However, some general guidelines have been listed below for consideration and planning purposes.

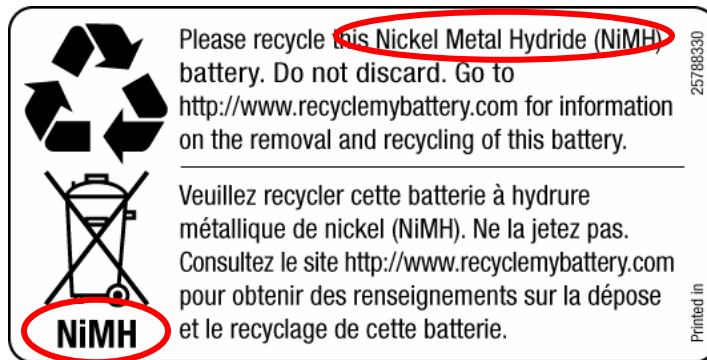
You are responsible for complying with all federal, state, and local laws and regulations relating to the management of IV/HV batteries generated at your facility. Please note that state and/or local laws can be more stringent than federal regulations, so be sure to check all three.

General Guidelines: IV/HV Battery Storage

Once the battery has been removed from the vehicle, you should consider:

1. Putting plastic tape over the battery terminals (to prevent short circuiting)
2. Storing the battery in a building or under shelter so that:
 - a. Batteries are kept dry
 - b. Batteries are not exposed to high temperatures
3. Protect batteries from being damaged (e.g. crushed or punctured)
4. IV/HV batteries can be accumulated for shipment. It is recommended that you ask about the specific packaging requirements for battery shipments from the

- recycler who will be receiving the batteries in order to avoid repacking/stacking of the batteries. Some packaging suggestions include:
- a. Stacking batteries uniformly on a pallet
 - b. Placing insulation material between layers of batteries
 - c. Stacking batteries no higher than 1.5x the width of a pallet
5. Batteries should be sorted by type. Keep lead acid batteries, NiMH batteries, and Li-Ion batteries separated from each other (e.g. separate pallets or storage locations). You can determine which type of IV/HV battery pack is in the vehicle by looking at the GM recycling label on the IV/HV battery.



NOTE: If a battery is damaged (physical damage or leakage), consult the MSDS of battery manufacturer for information on managing any leaking electrolyte.

General Guidelines: Shipping IV/HV Batteries for Recycling:

The NiMH batteries may be shipped for recycling under the US Federal Government's Universal Waste Rule in most situations. However, it is important to make sure that you check all federal, state, and local laws and regulations governing the shipping of batteries from your facility.

The recommended shipment mode is by ground using a truckload/less than truckload (LTL) carrier. UPS (small parcel) or air freight is not recommended. Check with other dismantlers in your area to determine if you can pool your battery shipments to make recycling more efficient.

Some general guidelines for preparing batteries for shipment:

- Make sure batteries are securely stacked on pallets
- Package batteries to prevent short-circuits and the dangerous evolution of heat (for example, by taping exposed battery terminals to insulate them)

Make sure that the shipping paperwork is filled out correctly and that the shipment is properly labeled per federal, state, and local laws and regulations. Check to make sure that you are complying with any recordkeeping requirements.

NOTE: A damaged battery (one that is leaking electrolyte from the battery pack) might need to be shipped as a hazardous waste depending on your geographic location. Check

your yellow pages (e.g. waste, rubbish and garbage removal, recyclables, recycling) to locate a company that specializes in transporting or managing hazardous wastes.

Commercial Battery Recyclers

GM is aware of the following companies that are involved in the recycling of batteries. This list is provided as a starting point for dismantlers who are removing NiMH batteries. GM is not recommending these recyclers nor is it an exhaustive list of available recyclers.

There are also companies that will act as battery consolidators who will take batteries away from your facility and consolidate/ship them with other batteries for recycling. Consult the yellow pages or check the internet to find consolidation companies in your area. If you work with a consolidation company, make sure to ask where the consolidator sends the batteries for recycling.

Some battery manufacturers will also accept batteries and consolidate them for recycling. Contact the appropriate battery manufacturer for additional information.

www.cobasys.com,

North America: Battery Recyclers

Inmetco: www.inmetco.com

Contact: Al Hardies

One Inmetco Drive

Ellwood City, PA 16117

724-758-2825

Kinsbursky/Toxco www.kinsbursky.com

Contact: Paul Schneider

1314 N. Anaheim Blvd.

Anaheim, CA 92801

800-548-8797

Reference Information:

Applicable USA Federal Regulations:

- US Federal Regulations: 40 CFR 273 “Universal Waste Rule”:
http://www.access.gpo.gov/nara/cfr/waisidx_03/40cfr273_03.html
- US Federal Regulations 49 CFR 173 (Shippers- General Requirements for Shipping and Packaging): http://www.access.gpo.gov/nara/cfr/waisidx_99/49cfr173_99.html
- US Federal Regulations 49 CFR 172 (HAZARDOUS MATERIALS TABLE, SPECIAL PROVISIONS, HAZARDOUS MATERIALS COMMUNICATIONS, EMERGENCY RESPONSE INFORMATION, AND TRAINING REQUIREMENTS):

<http://ecfrback.access.gpo.gov/otcqi/cfr/otfilter.cgi?DB=3&query=49000000172® ion=BIBSRT&action=view&SUBSET=SUBSET&FROM=1&SIZE=10&ITEM=1>

- (USA Federal) Universal Waste Rule Fact Sheet:
http://www.ehso.com/universal_waste_rule_fact_sheet.htm

Other North American References:

- Proact Fact Sheet on Battery Disposal:
<http://www.p2pays.org/ref/07/06033.htm#statewaste>
- EPA Regions: <http://www.epa.gov/epahome/locate2.htm>
- Links to State Environmental Agencies: <http://www.epa.gov/epahome/state.htm>
- GM Service Manual information (website)
<http://www.helminc.com/helm/homepage.asp?r>